

REMARKS

This Voluntary Amendment is submitted to incorporate a new limitation in the claims following an Advisory Action dated June 9, 2006. A Request for Continued Examination is being submitted herewith. No new matter is introduced.

5 In the final Office Action, the Examiner rejected claims 1-6, 10, 11, and 14-23 under 35 U.S.C. §103(a) as being unpatentable over Kuhmann et al. (United States Patent Number 6,832,013) in view of Gallup et al. (United States Patent Number 6,982,437), rejected claims 7 and 8 under 35 U.S.C. §103(a) as being unpatentable over Kuhmann et al. in view of Gallup et al., and further in view of Chan et al. (United States
10 Patent Number 5,122,852), rejected claim 9 under 35 U.S.C. §103(a) as being unpatentable over Kuhmann et al. in view of Gallup et al., and further in view of Burns (United States Patent Application Publication Number 2001/0046346), rejected claim 12 under 35 U.S.C. §103(a) as being unpatentable over Kuhmann et al. in view of Gallup et al., and further in view of Burdick, Jr. et al. (United States Patent Application Publication
15 Number 2002/0075107), and rejected claim 13 under 35 U.S.C. §103(a) as being unpatentable over Kuhmann et al. in view of Gallup et al., and further in view of Burdick, Jr. et al., and further in view of Coyle, Jr. et al. (United States Patent Number 5,101,090).

Independent Claims 1 and 21

20 Independent claims 1 and 21 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kuhmann et al. in view of Gallup et al. Regarding claim 1, the Examiner acknowledges that Kuhmann does not teach one or more cavities having a defined positioning and depth in the circuit board, but asserts that Gallup teaches using one or more etch stop layers to selectively remove material to provide one or more cavities having a defined positioning and depth in the circuit board (FIG. 5A and col. 6,
25 lines 8-17).

Applicants note that the present disclosure teaches that “the openings having a defined positioning and depth in the circuit board, fabricated using the above methodology, may be employed to optimize the alignment of optical components with waveguides.” (Page 3, lines 12-14.) The present disclosure also teaches, for example,
30 that the cavity provides “alignment along the x axis and y axis” (page 13, lines 21-24), and also teaches that such alignment typically requires an accuracy *better than 50 μm*,

e.g., 5 μm (page 6, lines 1-12; emphasis added). Kuhmann, however, is directed to “alignment features” that *protrude from lower layers of an assembly structure* (see, Abstract and FIGS. 5, 6, and 9-18). As the Examiner acknowledges, Kuhmann does not disclose or suggest cavities in a circuit board. Applicants also note that Gallup teaches a cavity 540 (col. 6, lines 8-17) and that a “laser 610 can be hermetically sealed in a cavity 640” (col. 6, lines 59-61). Gallup, however, does *not* disclose or suggest that the cavity is *utilized for aligning a component* and does *not* disclose or suggest that the cavity 540, 640 has a *defined positioning, as defined in the present specification* (see, for example, FIGS. 1, 2, 6, and 7 of Gallup). Independent claims 1 and 21 require using one or more etch stop layers and providing *one or more cavities* having a *defined positioning* and depth in the circuit board, wherein said one or more cavities provide for the alignment of optical elements. Neither Gallup nor Kuhmann disclose or suggest a *cavity having a defined positioning*, as defined in the present specification.

In addition, Applicants note that the independent claims have been amended to emphasize that the one or more cavities are provided for aligning one or more optical elements. Applicants also maintain that a person of ordinary skill in the art would not look to combine Gallup and Kuhmann since Gallup does not disclose or suggest utilizing a cavity for aligning elements.

Thus, Kuhmann and Gallup do not disclose or suggest using one or more etch stop layers and providing *one or more cavities* having a defined positioning and depth in the circuit board, wherein said one or more cavities provide for an alignment of one or more optical elements, as required by independent claims 1 and 21, as amended.

Additional Cited References

Chan was also cited by the Examiner for its disclosure of etch stop layers comprising gold. Applicants note that Chan is directed to grafted-crystal-film integrated optics and optoelectronic devices. Chan does *not* address the issue of creating cavities having a defined positioning and depth in a circuit board.

Thus, Chan does not disclose or suggest using one or more etch stop layers and providing *one or more cavities* having a defined positioning and depth in the circuit board, wherein said one or more cavities provide for an alignment of one or more optical elements, as required by independent claims 1 and 21, as amended.

Burns was also cited by the Examiner for its disclosure of etch stop layers comprising a reflective dielectric thin film. Applicants note that Burns is directed to a micromachined structure and to an opto-mechanical micromachined switch (paragraph 0001). Burns does *not* address the issue of creating cavities having a defined positioning and depth in a circuit board.

Thus, Burns does not disclose or suggest using one or more etch stop layers and providing *one or more cavities* having a defined positioning and depth in the circuit board, wherein said one or more cavities provide for an alignment of one or more optical elements, as required by independent claims 1 and 21, as amended.

Burdick was also cited by the Examiner for its disclosure of removing material using laser ablation techniques. Applicants note that Burdick is directed to a method for forming an interconnect structure. Burdick, however, does *not* address the issue of creating cavities having a defined positioning and depth in a circuit board.

Thus, Burdick does not disclose or suggest using one or more etch stop layers and providing *one or more cavities* having a defined positioning and depth in the circuit board, wherein said one or more cavities provide for an alignment of one or more optical elements, as required by independent claims 1 and 21, as amended.

Coyle was also cited by the Examiner for its disclosure of the use of a carbon dioxide laser for laser ablation techniques. Applicants note that Coyle is directed to methods and apparatus for making optical fiber couplers. Coyle does *not* address the issue of creating cavities having a defined positioning and depth in a circuit board.

Thus, Coyle does not disclose or suggest using one or more etch stop layers and providing *one or more cavities* having a defined positioning and depth in the circuit board, wherein said one or more cavities provide for an alignment of one or more optical elements, as required by independent claims 1 and 21, as amended.

Dependent Claims 2-20 and 22-23

Dependent claims 2-6, 10, 11, 14-20, and 22-23 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kuhmann et al. in view of Gallup et al., claims 7 and 8 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kuhmann et al. in view of Gallup et al., and further in view of Chan et al., claim 9 was rejected under 35 U.S.C. §103(a) as being unpatentable over Kuhmann et al. in view of Gallup et al., and

further in view of Burns, claim 12 was rejected under 35 U.S.C. §103(a) as being unpatentable over Kuhmann et al. in view of Gallup et al., and further in view of Burdick, Jr. et al., and claim 13 was rejected under 35 U.S.C. §103(a) as being unpatentable over Kuhmann et al. in view of Gallup et al., and further in view of Burdick, Jr. et al., and
5 further in view of Coyle, Jr. et al.

Claims 2-20 and 22-23 are dependent on claims 1 and 21, respectively, and are therefore patentably distinguished over Kuhmann et al., Gallup et al., Chan et al., Burns, Burdick, Jr. et al., and Coyle, Jr. et al. (alone or in any combination) because of their dependency from amended independent claims 1 and 21 for the reasons set forth
10 above, as well as other elements these claims add in combination to their base claim.

All of the pending claims, i.e., claims 1-23, are in condition for allowance and such favorable action is earnestly solicited.

If any outstanding issues remain, or if the Examiner has any further suggestions for expediting allowance of this application, the Examiner is invited to
15 contact the undersigned at the telephone number indicated below.

The Examiner's attention to this matter is appreciated.

Respectfully submitted,



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Kevin M. Mason
Attorney for Applicants
Reg. No. 36,597
Ryan, Mason & Lewis, LLP
1300 Post Road, Suite 205
Fairfield, CT 06824
25 (203) 255-6560